

Patent Claims

1. A method for determining the color effect of dispersive materials such as materials or biological substances of a multilayer system, in particular a series of layers in teeth or dental materials, wherein the remission of the multilayer system is calculated by means of forward Monte Carlo simulation of intrinsic optical parameters dispersion coefficient μ_s , anisotropy factor g and absorption coefficient of the different materials, calculated by inverse Monte Carlo simulation, taking into consideration refractive index n, thickness d of the respective layer of the materials as well as dispersion phase function of the individual materials and the color effect determined from the remission,
characterized in
that the intrinsic parameters dispersion coefficient μ_s , anisotropy factor g and absorption coefficient of each of the materials are first calculated on the basis of a layer thickness of material enabling transmission of light and that a corrected absorption coefficient μ_{ak} is then calculated by inverse Monte Carlo simulation on the basis of the remission of the respective material of an optically dense layer having a thickness d_D , the corrected absorption coefficient μ_{ak} as the absorption coefficient forming the basis for calculating the remission and the color effect of the multilayer system.
2. The method according to claim 1,
characterized in
that the intrinsic optical parameters are determined on the basis of spectrometric measurements.
3. The method according to claim 1,
characterized in
that the intrinsic optical parameters are taken from a data bank.
4. The method according to at least claim 1,
characterized in
that the intrinsic optical parameters dispersion coefficient μ_s , uncorrected absorption coefficient μ_a and anisotropy factor g of a material are calculated on the basis of macroscopic optical parameters of the material in the form of diffuse remission R_d as well as diffuse transmission T_d and/or total transmission T_t and/or collimated transmission T_c , taking into consideration the dispersion phase function of the material, thickness d of a layer of the material used during

determination of the macroscopic parameters and refractive index n of the material by means of inverse Monte Carlo simulation.

5. The method according to at least claim 1,

characterized in

that the remission of the layer system is calculated for the series of layers consisting of different materials on the basis of the corrected absorption coefficient μ_{ak} , the dispersion coefficient μ_s and the anisotropy factor g of each material, taking into consideration at least the dispersion phase function, the refractive index n and thickness d of each layer and series of layers by means of forward Monte Carlo simulation.

- 10 6. The method according to at least one of the preceding claims,

characterized in

15 that, when calculating the intrinsic optical parameters by means of the inverse Monte Carlo simulation, measurement parameters and/or measurement geometries from the experimental determination of the macroscopic optical parameters are taken into consideration.

- 20 7. The method according to claim 1,

characterized in

25 that the calculation of the color effect from the remission takes place by means of algorithms or multifactor analysis.

- 25 8. The method according to claim 1,

characterized in

that the color effect is calculated taking the geometric extension such as curvature of the layer system into consideration.

- 30 9. The method according to claim 6,

characterized in

that, when using an Ulbricht sphere-type spectrometer as measurement geometry, test geometry, diaphragm diameter, sphere parameter, beam divergence or diameter of a light spot are used as a basis.